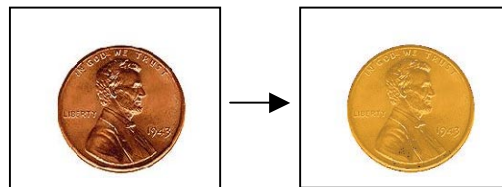


Activity # 14

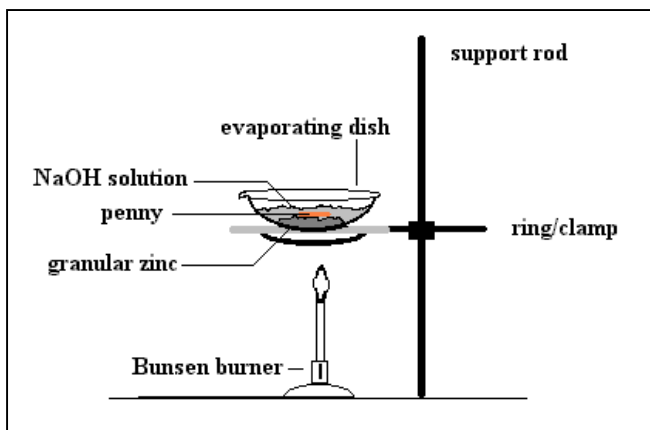
Title: The Brass Penny-Student's copy



Purpose: To investigate the preparation of an alloy

Materials: dilute solution of hydrochloric acid (HCl) in beaker, dilute sodium hydroxide solution (NaOH) in flask, pipette for dispensing NaOH solution, granular zinc, pennies (the newer and cleaner the better!), evaporating dish, Bunsen burner, support rod, ring/clamp, wire gauze, tweezers, weighing dish, laboratory balance, baking soda, vinegar, magnet (optional) to test physical properties of the copper and the brass

Hazards/Precautions: Because of the use of a caustic base and a corrosive acid, safety goggles will be worn at all times. The wearing of aprons is mandatory. Sodium bicarbonate (baking soda) will be used to neutralize any acid spills and acetic acid (vinegar) will be used to neutralize any NaOH spills. Because of the use of open flames, long hair will be tied back and no coats or loose clothing will be worn.



Procedure:

1. Using your tweezers, carefully "etch" your penny by placing it into the HCl for a few seconds (until the coin appears bright).
2. Remove the penny from the acid with the tweezers and rinse it under running water.
3. Add 15.0 g of granular Zn to your evaporating dish and then add 15 mL of NaOH solution to completely cover the Zn. Using your tweezers, place the acid-etched penny on top of the Zn in your evaporating dish.
4. GENTLY heat the evaporating dish and contents over a "cool" burner flame until the entire penny acquires a silvery coating. This will require that the penny be turned over occasionally with the tweezers during this operation. Do not boil ...and do not allow the NaOH to splatter. Replenish the NaOH solution as necessary to make certain the penny is always covered with liquid.
5. Use tweezers to remove the penny by its edge from the dish and rinse clean under SLOWLY running water. DO NOT RUB OFF THE SILVERY COATING!
6. Grasp the penny by its edge with the tweezers and hold it in a cool burner flame... continuously flip-flopping it every second so that both sides of the penny are heated equally. Remove it from the flame

as soon as the penny turns a bright gold color. **DO NOT OVERHEAT!** Allow your penny to cool on the edge of the wire gauze at your lab station or immediately hold it under cold water.

7. Teacher instructions will inform you as to the clean-up procedure for your lab stations.

FOLLOW-UP/CONCLUSIONS/ANALYSIS:

1. Define all five underlined words in the above text. (Hey, you may need a dictionary!)
2. Why must one be especially careful when using post-1982 pennies?
3. What did the etching process appear to do to the penny?
4. What was the silvery substance that was produced on the penny in PROCEDURE step #4?
5. Why did the silvery penny turn gold in color after being heated in the burner flame?
6. Why was the heat even necessary to produce this change?
7. List two physical properties of zinc and two for copper
8. What are the advantages of brass over either of the two metals of which it is composed?
9. Which metal do you think was the solvent and which was the solute in the metallic solution (alloy) prepared in this activity? Give a reason for your answer.
10. What could be done to preserve the luster of your "brass penny?"